

existing needle geometry was used to regenerate new treatment plans for three radiation schemes: 1x19.0Gy, 1x19.5Gy and 1x20Gy. All plans were optimized according to the following objectives:

Prostate V100% \geq 95% Prostate D90% \geq 100%

Bladder D1cc < 16.0 Gy Bladder D2cc < 15.5 Gy

Rectum D1cc < 15.5 Gy Rectum D2cc < 14.5 Gy Rectum V100% 0 cc

Urethra D0.1cc < 21.0 Gy Urethra D10% < 20.5 Gy Urethra V120% 0 cc

A total of 90 plans were generated using an inverse planning module. The planning target volume (PTV) was the prostate without margins. The coverage of the prostate was maximized considering the dose constraints for the organs at risk (OAR). The primary end point of this study was the feasibility of above mentioned target coverage and OAR constraints. The secondary end point was to investigate the restricting factors to reach a feasible plan stratified to prostate volume, OAR position and implant geometry.

Results: The average prostate V100% for the 19.0, 19.5 and 20.0Gy schemes was 96.6%, 95.3% and 93.0% respectively with 83%, 57% and 33% of plans meeting this objective. The D90% of the prostate averaged 20.3 Gy, 20.3 Gy and 20.4 Gy respectively. Only 4 plans failed this objective.

The 40-70cc group showed an average prostate V100% of 96.3% an increase of 2.1% and 2.7% compared to the < 40cc and >70cc group respectively.

The number of needles had no influence on prostate coverage and urethra constraints. The rectum and bladder D1cc and D2cc increased for the 17-22 needle group with 5.7%, 8.6% and 3.3%, 5.3% respectively.

The average prostate V100% decreased in patients with a larger distance between the urethra and the posterior border of the prostate.

Prostate V100% increased from 95.7% to 97.5% in patients with a prostate to rectum distance of 2mm or more.

Conclusion: Single fraction HDR brachytherapy as monotherapy in patients with prostate cancer is feasible using our current implant geometry. Considering the OAR constraints, an acceptable D90% was reached in 96% of plans. Prostate volume, implant geometry and OAR proximity have a substantial impact on target coverage.

OC-0558

Automated VMAT planning in prostate cancer patients using a Single Arc SIB Technique

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Purpose or Objective: To evaluate the feasibility of automated single arc treatment planning for prostate cancer patients using a commercially available treatment planning system. We also compared the resultant AutoplanningTM plans with our current institutional inverse planned prostates.

Material and Methods: A technique was created within the AutoplanningTM module of the PinnacleTM treatment planning system using institutional prescription dose/fractionation and OAR constraints to be delivered with a single arc VMAT plan. The Planning Target Volume PTV1 (74Gy) encompasses the prostate; PTV2 (66.6Gy) encompasses the prostate and the base or full seminal vesicles plus setup margins both delivered simultaneously in 37 fractions. Plans were generated for 10 randomly selected patients with prostate cancer treated at our institution, using the automated treatment technique template. Plan quality was assessed using institutional criteria and ICRU 83 criteria: D98, D2, Conformity Index (CI), Homogeneity Index (HI) and Remaining Volume at Risk (RVR). OAR constraints for rectum D65<30%, Bladder D50<50%, Femoral Heads, D50< 50%. Bowel D50<50cc, D55<14cc and D60< 1cc were assessed. The time for planning was also documented.

The ten AutoplanningTM technique plans were compared with clinical institutional VMAT prostate plans in a blinded study.

Plans were compared by Clinical Oncologists, assessing clinical coverage of the PTVs, OAR sparing and DVH parameters.

Results: Table 1 summarises results of the automated plan generation. The automated technique produced highly conformal plans that met institutional clinical constraints for 7 of 10 plans in a single run. In the 3 cases that failed, overlap of the PTV with rectum or bowel exceeded institutional DVH goals (Fig 1). There were no significant differences between the two planning techniques when comparing CI and HI.

Volume	Dose	Vol (%)	Mean	SD
PTV				
PTV1 (Min)	D63.27	98	99.81	+/-0.395
PTV1 (Max)	D75.48	2	0.13	+/-0.108
PTV2 (Min)	D70.3	98	99.99	+/-0.031
PTV2 (Max)	D70.0	2	0.04	+/-0.005
CI PTV1			1.17	+/-0.06
CI PTV2			1.09	+/-0.02
HI PTV1-2			0.012	+/-0.006
HI PTV2			0.035	+/-0.00
RVR (Mean -Gy)			23.369	+/-4.93
OAR				
Rectum	D65	<30	17.61	+/-3.964
Bladder	D50	<50	17.11	+/-5.748
Femoral Heads	D50	<50	0	+/-0
Bowel	D4.5	<50	18.82	+/-19.44

Table 1 Dosimetric Results for PTV and OAR with Automated Planning Technique

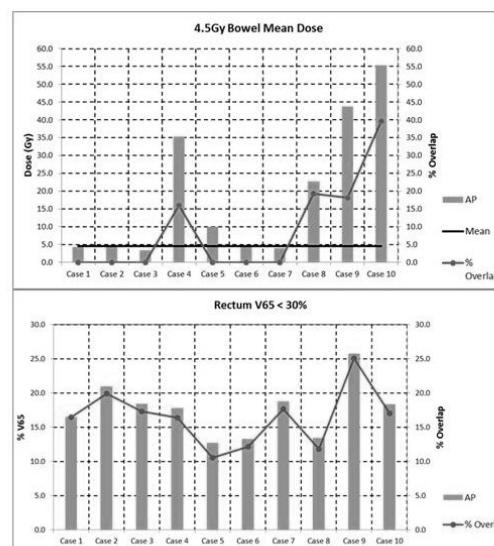


Fig 1. Impact of PTV overlap on Mean OAR doses for automated planning technique.

Conclusion: The automated technique for VMAT planning for prostate cancer is a promising solution which is feasible and may improve efficiency by automating cases that meet institutional dose volume constraints. We will present the results of the blinded plan selection study at the meeting.

OC-0559

The impact of rectal interventions on target motion and rectal variability in prostate radiotherapy

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